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<div>Division of Forensic Science</div> <div>FIREARM/TOOLMARK TRAINING MANUAL</div>	Amendment Designator:
	Effective Date: 13 May 2003
<div>6 MANUFACTURE OF MODERN AMMUNITION</div> <div>6.1 Assignments</div> <div>6.1.1 Define in the notebook and know the meaning of the following terms as they relate to modern ammunition and its manufacture:</div> <ul style="list-style-type: none"> • Cartridge • Headstamp • Nylon-coated lead bullet • Proof cartridge • "Silvertip" bullet • Tapered cartridge • Antimony • Extractor groove • Arsenic • Gauge • Chilled shot • Battery cup • High brass, low brass • Brass • Lubaloy • "Rule of 17" • Dram equivalent • Wadding • Single base, double base • Shot collar • Boattail bullet • Crimp • Casting seam • Bunter • Sprue • Bullet • Round-nosed bullet • Hollow-point bullet • Jacketed bullet • Copper coated lead bullet • Cartridge case • Bullet sizing • Primer • Wadcutter bullet • Shotshell • Semi-wadcutter bullet • Shotshell casing • Soft point bullet • Bottleneck cartridge • Spitzer bullet • Rebated-rim cartridge • Swaging • Rimless cartridge • Cast lead bullet 	

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<div> <ul style="list-style-type: none"> • Rimmed cartridge • Mold marks • Semi-rimmed cartridge • Truncated-nosed bullet • Shoulder • Cannelure • Neck • Ogive • Mouth • Brass-coated lead bullet • Head <p><i>(Use Training Assignment #9 and Practical Exercise #1 to complete this objective.)</i></p> <div> <div>_____</div> <div>Training Officer</div> </div> <div> <div>_____</div> <div>Date</div> </div> <p>6.1.2 Sketch the cross-section of Berdan and Boxer primers, showing their relationship to the head of the cartridge.</p> <p><i>(Use Training Assignment #10 to complete this objective.)</i></p> <div> <div>_____</div> <div>Training Officer</div> </div> <div> <div>_____</div> <div>Date</div> </div> <p>6.1.3 Discuss the purpose and essential ingredients of priming mixture used in modern cartridges.</p> <p><i>(Use Training Assignment #10 to complete this objective.)</i></p> <div> <div>_____</div> <div>Training Officer</div> </div> <div> <div>_____</div> <div>Date</div> </div> <p>6.1.4 Know and discuss the difference between caliber and caliber type. Illustrate this difference by relating these terms to a discussion of the .22 caliber, .30 caliber and .38 caliber families of cartridges.</p> <p><i>(Use Training Assignment #10 and Practical Exercise #2 to complete this objective.)</i></p> <div> <div>_____</div> <div>Training Officer</div> </div> <div> <div>_____</div> <div>Date</div> </div> <p>6.1.5 Visit at least one ammunition-manufacturing facility such as Remington, Federal or Winchester to observe the manufacture of rimfire and centerfire cartridges and shotshells. Make detailed notes of the manufacturing processes and generate a written report for section files. Also, prepare an oral presentation for section members upon your return. Particular emphasis should be placed on pellet and bullet manufacture, shotshell casing and cartridge case manufacture and the steps involved in the loading of cartridges and shotshells. Coordinate this visit with the Training Officer.</p> <div> <div>_____</div> <div>Training Officer</div> </div> <div> <div>_____</div> <div>Date</div> </div> </div>	

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<p>6.2 Reference Materials Modern Ammunition Evolution and Manufacture</p> <p>The following reference materials serve several purposes:</p> <ul style="list-style-type: none"> • To provide a wider range of resources in a given topic • To provide reference materials for future use • To gain additional in depth knowledge in these subject areas <p>Other references encountered in this category should be made as additional notes at the end of this listing</p> <p>6.2.1 Books</p> <p><u>ANSI/SAAMI Centerfire Pistol & Revolver Voluntary Performance Standards</u>, Sporting Arms and Ammunition Manufacturers' Institute, Wilton, CT, current edition.</p> <p><u>ANSI/SAAMI Centerfire Rifle Voluntary Performance Standards</u>, Sporting Arms and Ammunition Manufacturers' Institute, Wilton, CT, current edition.</p> <p><u>ANSI/SAAMI Rimfire Voluntary Performance Standards</u>, Sporting Arms and Ammunition Manufacturers' Institute, Wilton, CT, current edition.</p> <p><u>ANSI/SAAMI Shotshell Voluntary Performance Standards</u>, Sporting Arms and Ammunition Manufacturers' Institute, Wilton, CT, current edition.</p> <p>Association of Firearm and Tool Mark Examiners Standardization Committee, <u>Glossary of the Association of Firearm and Tool Mark Examiners</u> (Appendix F, Firearm Ignition Systems), 3rd edition, Available Business Printing, Inc., Chicago, 1994.</p> <p>Barnes, F.C., <u>Cartridges of the World</u>, DBI Books, Inc., Northbrook, IL, current edition.</p> <p>Davis, T.L., <u>The Chemistry of Powder and Explosives</u>, reprinted by Angriff Press, Las Vegas, NV (Originally printed in two separate volumes in 1941 and 1943; also reprinted by John Wiley and Sons, New York, 1950.) pp. 244-330, pp. 400-458.</p> <p>Frost, G.E., <u>Ammunition Making, An Insider's Story</u>, National Rifle Association, Fairfax, VA, 1990.</p> <p>"The Ever-changing Shotshell Story," <u>Gun Digest</u>, 1973 edition, DBI Books, Northbrook, IL.</p> <p>Hackley, F.W., Woodin, W.H., and Scranton, E.L., <u>History of Modern U.S. Military Small Arms Ammunition</u>, MacMillan Co, 1967.</p> <p>Halsey, A., ed., <u>The NRA Handloader's Guide</u>, National Rifle Association, Washington, DC, 1968.</p> <p><u>Handloaders' Bullet Making Annual</u>, Wolf Publishing Co., Prescott, AZ, current edition.</p> <p>Hatcher, J.S., <u>Hatcher's Notebook</u>, Military Service Publishing Co., Harrisburg, PA, 1947, pp. 300-333.</p> <p>Hatcher, J.S., Jury, F.J., and Weller, J., <u>Firearms Investigation, Identification and Evidence</u>, 2nd edition, Stackpole Books, Harrisburg, PA, 1957, Chapters 3-6.</p> <p>Hayes, T.J., <u>Elements of Ordnance</u>, John Wiley and Sons, Inc., New York, 1938.</p>	

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<p>Hoyen, G.A., <u>The History and Development of Small Arms Ammunition</u>, Volumes I-II, Armory Publications, Tacoma, 1981.</p> <p><u>The Illustrated Reference of Cartridge Dimensions</u>, Wolfe Publishing Company, Prescott, AZ, 1993.</p> <p>Labbett, P., <u>Military Small Arms Ammunition of the World 1945-1980</u></p> <p>Logan, H.C., <u>Cartridges, A Pictorial Digest of Small Arms Ammunition</u>, Standard Publications, 1948.</p> <p>“Lyman Reloading Manual”</p> <p>Mann, F.W., <u>The Bullet’s Flight from Powder to Target</u>, Standard Printing and Publishing Co., Huntington, WV. (Reprinted by Palladium Press for the NRA Firearms Classics Library, 1997).</p> <p>Ohart, T.C., <u>Elements of Ammunition</u>, John Wiley and Sons, Inc., New York, 1946.</p> <p><u>SAAMI Publication #200, Smokeless Powder</u>, Sporting Arms and Ammunition Manufacturers’ Institute, Wilton, CT.</p> <p><u>SAAMI Publication #201, Primers</u>, Sporting Arms and Ammunition Manufacturers’ Institute, Wilton, CT.</p> <p><u>SAAMI Publication #202, Sporting Ammunition</u>, Sporting Arms and Ammunition Manufacturers’ Institute, Wilton, CT.</p> <p><u>SAAMI Publication #204, Facts About Sporting Ammunition</u>, Sporting Arms and Ammunition Manufacturers’ Institute, Wilton, CT.</p> <p><u>SAAMI Publication #226, Ammunition Types and Characteristics - Handguns</u>, Sporting Arms and Ammunition Manufacturers’ Institute, Wilton, CT.</p> <p>Sharp, P.B., <u>Complete Guide to Handloading</u>, Funk and Wagnells, New York, 1937.</p> <p>---. <u>The Rifle in America</u>, William Morrow & Co., New York, 1938, pp. 28-43.</p> <p>Simmons, R.F., <u>Wildcat Cartridges</u>, William Morrow & Co., 1947.</p> <p>“Speer Reloading Manual”</p> <p>Steindler, <u>Firearms Dictionary</u></p> <p>6.2.2 Periodicals</p> <p>“Fundamentals -- Internal Ballistics,” <u>American Rifleman</u>, Feb. 1963, pp. 32-35.</p> <p>“Gunpowder Development,” <u>American Rifleman</u>, Oct. 1959, pp. 38-40.</p> <p>Hatcher, J.S., “This Stuff Gunpowder,” <u>American Rifleman</u>, Aug. 1949, pp. 32-34 and Sep. 1949, pp. 35-36.</p> <p>“Modern Gunpowders,” <u>American Rifleman</u>, Oct. 1949, pp.26-30.</p> <p>Weller, J., “Quality in U.S. Ammunition,” <u>American Rifleman</u>, Oct. 1975, pp.48-51.</p>	

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<div> <div>6.2.3 AFTE Journal</div> <div> Bydal, B.A., "Percussion Primer Mixes," 1990; 22(1): 1-26. Dillon, J.H., "The Manufacture of Conventional Smokeless Powder," 1991; 23(2): 682-688. Johnson, T.D., and Matty, W., "Eclipse All Plastic Shotshells," 1983; 15(4):60. Matty, W.P., "Primer Composition and Gunshot Residue," 1987; 19(1): 8-13. </div> <div>6.2.4 Videotapes</div> <div> <u>Every Single Round</u>, Federal Cartridge Company, Anoka, MN, 1993. <u>Metallic Cartridge Reloading</u>, Lenny Magill Productions, San Diego, CA. </div> <div>◆ End</div> </div>	